

Akodon serrensis Thomas, 1902 (Mammalia: Rodentia: Sigmodontinae): Records in Santa Catarina state, southern Brazil

André F. Testoni¹, Jaqueline Fumis¹, Sérgio L. Althoff¹, Fernando R. Tortato² and Jorge J. Cherem^{3*}

- 1 Universidade Regional de Blumenau, Centro de Ciências Exatas e Naturais, Departamento de Ciências Naturais, Laboratório de Biologia Animal. Rua Antônio da Veiga, 140, Victor Konder. CEP 98012-000. Blumenau, SC, Brazil.
 - 2 Universidade Federal de Mato Grosso, Instituto de Biociências, Programa de Pós-Graduação em Ecologia e Conservação da Biodiversidade. Av. Fernando Corrêa da Costa, 2367, Bairro Boa Esperança, Caixa Postal 3203. CEP 78060-970. Cuiabá, MT, Brazil.
 - 3 Caipora Cooperativa para Conservação da Natureza. Av. Desembargador Vitor Lima, 260/513, Carvoeira. CEP 88040-400. Florianópolis, SC, Brazil.
- * Corresponding author. E-mail: jjcherem@yahoo.com.br

ABSTRACT: We report *Akodon serrensis* Thomas, 1902 from three localities in the state of Santa Catarina, in southern Brazil. The specimens were identified based on cytogenetic and craniometric analyses. These are the first records of *A. serrensis* collected in Santa Catarina, which extend the range of this species ca. 330 km S.

The genus *Akodon* includes small-sized rodents, which have tail length little smaller than the head and body length, a light to dark brown dorsal color, and lack a defined limit between the dorsal and ventral colors. The ventral hairs of this genus have a grayish base and grayish-yellow or grayish-white apex (Bonvicino *et al.* 2008). Forty-one species of *Akodon* are recognized in South America (Musser and Carleton 2005), 10 of which occur in Brazil (Oliveira and Bonvicino 2006). Only two species were known from the state of Santa Catarina, in southern Brazil (Cherem *et al.* 2004). These are *A. montensis* Thomas, 1913, with the diploid number ($2n$) = 24 and the number of autosomal arms (FNa) = 42, and a taxon with $2n$ = 44 and FNa = 44, which has been treated as *A. reigi* González *et al.*, 1998 or *A. paranaensis* Christoff *et al.*, 2000 (see Pardiñas *et al.* 2003; Gonçalves *et al.* 2007; D'Elia *et al.* 2008).

In this paper, a third species of *Akodon* from Santa Catarina, *A. serrensis* Thomas, 1902, is reported. This species was thought to possibly occur in the state (Cherem *et al.* 2004; Bonvicino *et al.* 2008), but no records of voucher specimens have been reported in the literature.

Akodon serrensis was described by Thomas (1902) based on five males from Roça Nova, in the state of Paraná, in southern Brazil. The diagnostic characters cited by Thomas (1902) include the rich ochraceous color of the tips of its belly hairs, the ochraceous color of its inguinal region, and the proportions of its skull as well very large molars (in proportion). Karyologically, *A. serrensis* shows $2n$ = 46 and FNa = 46 (Geise *et al.* 1998; Christoff *et al.* 2000). Phylogenetically, some molecular analyses (*e.g.*, D'Elia 2003) identified a sister group relationship between *A. serrensis* and *Thaptomys*. If so that species would falls outside the *Akodon* genus, besides major morphological similarities to *Akodon* rather than *Thaptomys*.

Akodon serrensis has been reported from the Brazilian states of Paraná, São Paulo, Rio de Janeiro, Espírito Santo and Minas Gerais, in mountainous and upper mountainous

woodlands in the Atlantic Forest biome and in high-altitude grasslands (Geise *et al.* 1998; Hershkovitz 1998; Christoff *et al.* 2000; Geise *et al.* 2001; Bonvicino *et al.* 2002; Geise *et al.* 2004). Pereira *et al.* (2005) reported *A. serrensis* for the Misiones province, in Argentina.

The first records of *A. serrensis* for the state of Santa Catarina are from three localities, which extend the range of this species ca. 330 km S: State Biological Reserve of Sassafrás (REBio Sassafrás) (26°42' S, 49°40' W, 950 m), Doutor Pedrinho county; Alto da Boa Vista (27°42' S, 49°09' W, 1200 m), Rancho Queimado county; and Gateados Farm (27°58' S, 50°49' W, 920-1000 m), Campo Belo do Sul county (Figures 1-2). These localities are found within the Atlantic Forest biome, in the *Floresta Ombrófila Mista* ecosystem. In Alto da Boa Vista, *A. serrensis* was captured along the edges of forest fragments, near high-altitude grasslands, which are used as cattle pastures.

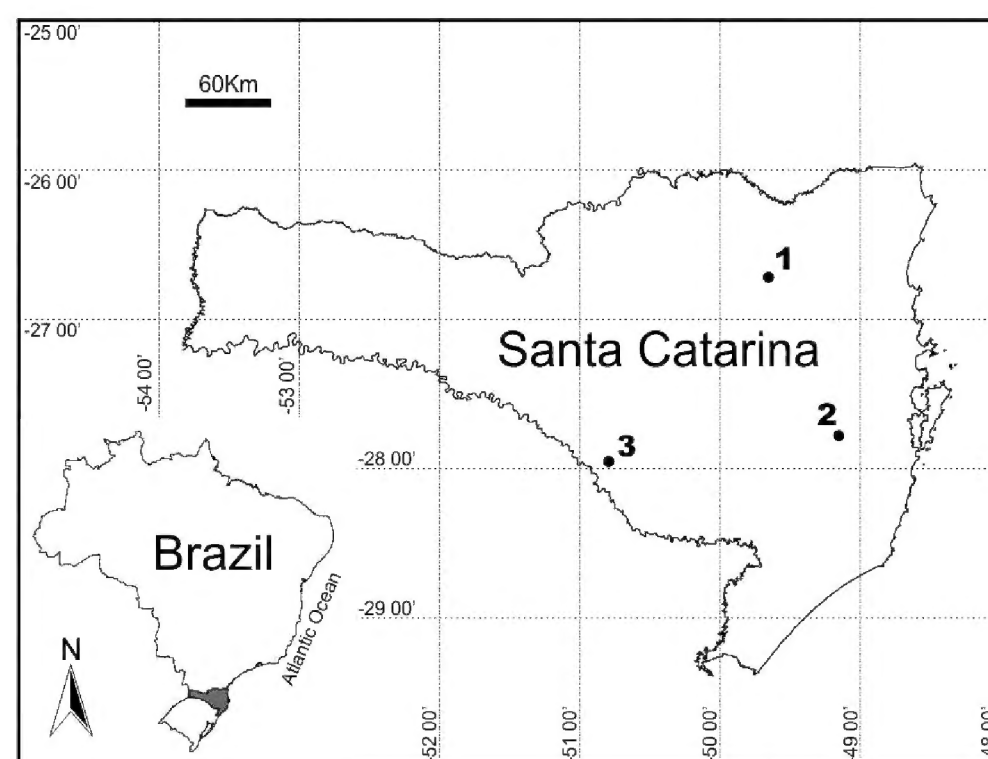


FIGURE 1. Collecting localities of *Akodon serrensis* in the state of Santa Catarina, southern Brazil: 1) State Biological Reserve of Sassafrás, Doutor Pedrinho; 2) Alto da Boa Vista, Rancho Queimado; 3) Gateados Farm, Campo Belo do Sul.



FIGURE 2. *Akodon serrensis* (UFSC 3805) from Alto da Boa Vista, Rancho Queimado county, Santa Catarina, southern Brazil.

Ten specimens of *A. serrensis* were collected (IBAMA license numbers: 016/08 and 11743-1) and housed at the Scientific Collection of Animal Biology Laboratory of the Universidade Regional de Blumenau (FURB), Blumenau, and at the Mammal Scientific Collection of the Universidade Federal de Santa Catarina (UFSC), Florianópolis, which are both in the state of Santa Catarina (Table 1). Tissue samples for DNA analysis were taken from the vouchers

and housed at the same institutions.

These specimens of *A. serrensis* are dorsally dark brown and ventrally ochraceous, mainly within the inguinal region. In relation to the other two species of *Akodon* from Santa Catarina, all *A. serrensis* examined can be distinguished by their relatively broad cranial case, wider interorbital region, short rostrum and nasals, longer palate and larger molars, without anteromedian flexum/flexid in first upper molar (Figure 3), even in younger specimens.

The specimens from REBio Sassafrás and Gateados Farm were cytogenetically analysed, through direct preparation of marrow according to Ford and Hamerton (1956), with modifications proposed by Sbalqueiro and Nascimento (1996). A karyotype of $2n = 46$ and $Fna = 46$ was obtained, the same reported for specimens from the states of Paraná, São Paulo, Rio de Janeiro and Espírito Santo (Geise *et al.* 1998; Christoff *et al.* 2000; Cáceres 2004).

The new records of *A. serrensis* from Santa Catarina, which were recently collected, indicate that the mammals of this state have not been well surveyed, even in coastal regions where most studies about mammals have occurred. It also indicates the importance of biological collecting and adequate housing of scientific collections, even though there is public opposition and criticism of these activities, especially for “charismatic megafauna” (Patterson 2002).

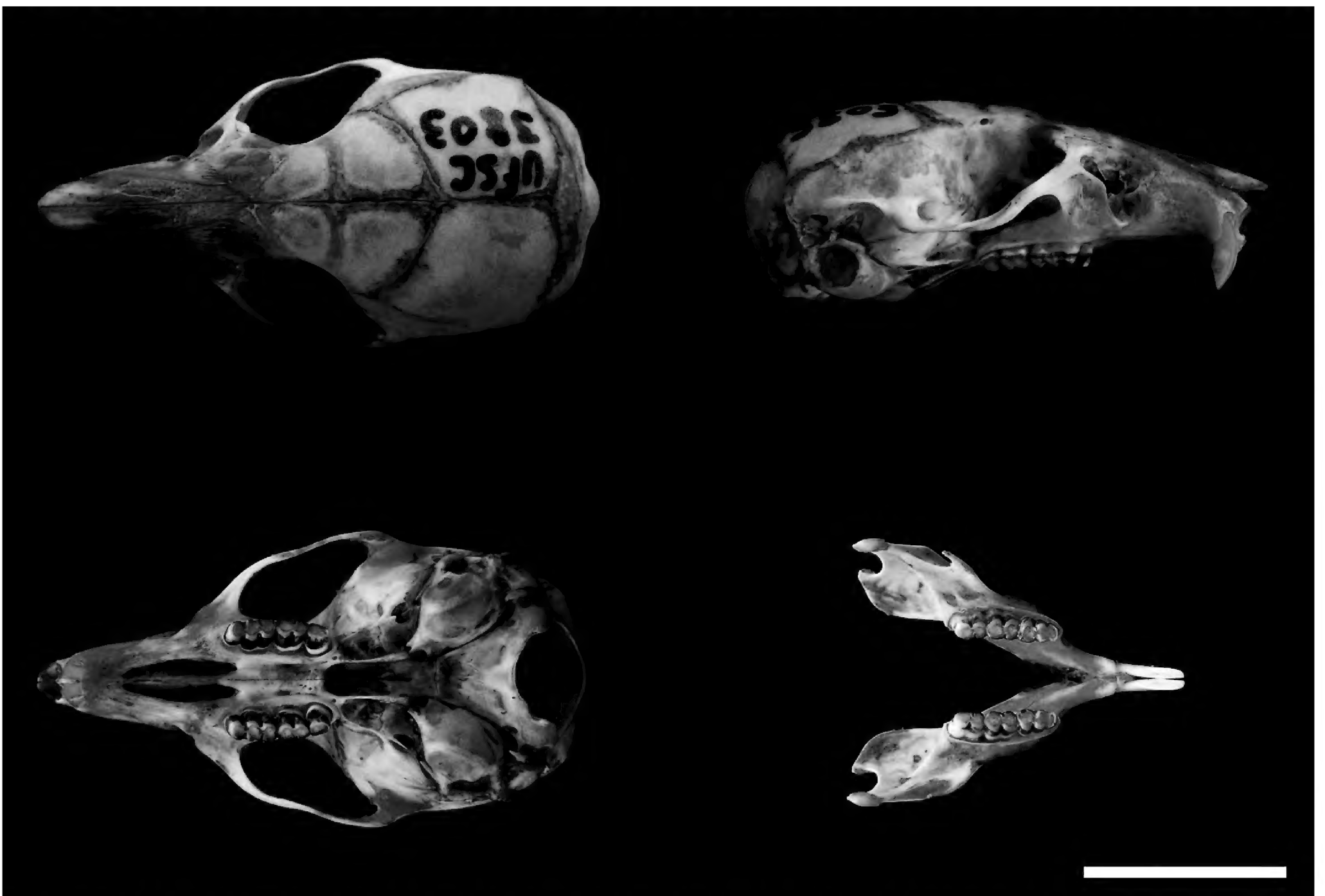


FIGURE 3. Dorsal, ventral and lateral view of skull and occlusal view of mandible of *Akodon serrensis* (UFSC 3803) from Alto da Boa Vista, Rancho Queimado county, Santa Catarina, southern Brazil (bar = 10mm).

TABLE 1. Locality, catalog number, date, sex, external measurements (in mm) and weight (in g) of specimens of *Akodon serrensis* from Santa Catarina state, southern Brazil. F, female; I, sex unknown; M, male; W, body mass; TO, total length; TL, tail length; E, ear length; HFC, hind foot length with claw; HF, hind foot length without claw.

| LOCALITY | NUMBER | DATE | SEX | W | TO | TL | E | HFC | HF |
|-------------------|------------|--------------|-----|----|-----|----|------|------|------|
| Doutor Pedrinho | FURB 12135 | 19 VIII 2006 | M | 27 | 165 | 75 | 19 | 22.3 | 20.3 |
| | FURB 12139 | 19 VIII 2006 | F | 26 | 165 | 70 | 17 | 21.7 | 19.4 |
| | FURB 12248 | 03 XI 2006 | F | 20 | - | - | - | - | - |
| | FURB 12249 | 03 XI 2006 | I | 20 | - | - | - | - | - |
| | FURB 12702 | 06 VI 2008 | M | 26 | 167 | 78 | 15 | 25 | 23.5 |
| Campo Belo do Sul | FURB 12234 | 23 X 2006 | F | 22 | 163 | 74 | 19 | 24 | 22 |
| Rancho Queimado | UFSC 3698 | 02 V 2008 | F | 27 | 174 | 82 | 18 | 26 | 24 |
| | UFSC 3802 | 18 VI 2008 | M | 24 | 180 | 84 | 17 | 25.5 | 23.5 |
| | UFSC 3803 | 19 VI 2008 | F | 20 | 168 | 80 | 16 | 24 | 22 |
| | UFSC 3805 | 20 VIII 2008 | M | 20 | 180 | 86 | 17.5 | 26 | 24.5 |

ACKNOWLEDGMENTS: The authors thank the Fundação de Meio Ambiente do Estado de Santa Catarina (FATMA), Modo Battistella Reflorestamento S/A (MOBASA) and Florestal Gateados Ltda. for the logistical support at REBio Sassafrás and the Gateados Farm, and Ivo Ghizoni-Jr. and José Tavares Neto for field support in Alto da Boa Vista. The authors also thank Nilton Cáceres for reviewing the manuscript and Nathan Smith for reviewing the English.

LITERATURE CITED

Bonvicino, C.R., S.M. Lindbergh and L.S. Maroja. 2002. Small non-flying mammals from conserved and altered areas of Atlantic forest and Cerrado: comments on their potential use for monitoring environment. *Revista Brasileira de Biologia* 62(4B): 765-774.

Bonvicino, C.R., J.A. Oliveira and P.S. D'Andrea. 2008. *Guia dos Roedores do Brasil, com chaves para gêneros baseadas em caracteres externos*. Rio de Janeiro: Centro Pan-Americano de Febre Aftosa - OPAS/OMS. 120 p.

Cáceres, N.C. 2004. Occurrence of *Conepatus chinga* (Molina) (Mammalia, Carnivora, Mustelidae) and other terrestrial mammals in the Serra do Mar, Paraná, Brazil. *Revista Brasileira de Zoologia* 21(3): 577-579.

Cherem, J.J., P.C. Simões-Lopes, S.L. Althoff and M.E. Graipel. 2004. Lista dos mamíferos do estado de Santa Catarina, sul do Brasil. *Mastozoología Neotropical* 12(2): 151-184.

Christoff, A.U., V. Fagundes, I.J. Sbalqueiro, M.S. Mattevi and Y. Yonenaga-Yassuda. 2000. Description of a new species of *Akodon* (Rodentia, Sigmodontinae) from southern Brazil. *Journal of Mammalogy* 81: 838-851.

D'Elía, G. 2003. Phylogenetics of Sigmodontinae (Rodentia, Muroidea, Cricetidae), with special reference to the akodont group, and with additional comments on historical biogeography. *Cladistics* 19: 307-323.

D'Elía, G., I. Mora, P. Myers and R.D. Owen. 2008. New and noteworthy records of Rodentia (Erethizontidae, Sciuridae, and Cricetidae) from Paraguay. *Zootaxa* 1784: 39-57.

Ford, C.E. and J.L. Hamerton. 1956. A colchicine hypotonic citrate squash sequence for mammalian chromosomes. *Stain Technology* 31: 247-51.

Geise, L., F.C. Canavez and H.N. Seuánez. 1998. Comparative karyology in *Akodon* (Rodentia, Sigmodontinae) from southeastern Brazil. *Journal of Heredity* 89: 158-163.

Geise, L., M.F. Smith and J.L. Patton. 2001. Diversification in the genus *Akodon* (Rodentia, Sigmodontinae) in Southeastern South America: mitochondrial DNA sequence analysis. *Journal of Mammalogy* 82(1): 92-101.

Geise, L., L.G. Pereira, D.E.P. Bossi and H.G. Bergallo. 2004. Pattern of elevational distribution and richness of non volant mammals in Itatiaia National Park and its surroundings, in Southeastern Brazil. *Brazilian Journal of Biology* 64(3B): 599-612.

Gonçalves, P.R., P. Myers, J.F. Vilela and J.A. Oliveira. 2007. Systematics of species of the genus *Akodon* (Rodentia: Sigmodontinae) in Southeastern Brazil and implications for the biogeography of the campos de altitude. *Miscellaneous Publications, Museum of Zoology, University of Michigan* 197: 1-24.

Hershkovitz, P. 1998. Report on some sigmodontine rodents collected in southeastern Brazil with descriptions of a new genus and six new species. *Bonner Zoologische Beiträge* 47(3/4): 193-256.

Musser G.G. and M.D. Carleton. 2005. Superfamily Muroidea; p. 894-1531 *In* D.E. Wilson and D.M. Reeder (ed.). *Mammal Species of the World: A Taxonomic and Geographic Reference*. Baltimore: The Johns Hopkins University Press.

Oliveira, J.A. and C.R. Bonvicino. 2006. Ordem Rodentia; p. 347-406 *In* N.R. Reis, A.L. Peracchi, W.A. Pedro and I.P. Lima (ed.). *Mamíferos do Brasil*. Curitiba: Secretaria Estadual de Meio Ambiente e Recursos Hídricos do Paraná.

Pardiñas, U.F.J., G. D'Elía and S. Cirignoli. 2003. The genus *Akodon* (Muroidea: Sigmodontinae) in Misiones, Argentina. *Mammalian Biology* 68: 129-143.

Patterson, B.D. 2002. On the continuing need for scientific collecting of mammals. *Mastozoología Neotropical* 9(2): 253-262.

Pereira J., P. Teta, N. Fracassi, A. Johnson and P. Moreyra. 2005. Sigmodontinos (Rodentia, Cricetidae) de la Reserva de Vida Silvestre Uruguá-í (Provincia de Misiones, Argentina), con la confirmación de la presencia de "*Akodon*" *serrensis* en la Argentina. *Mastozoología Neotropical* 12(1): 83-89.

Sbalqueiro, I.J. and A.P. Nascimento. 1996. Occurrence of *Akodon cursor* (Rodentia, Cricetidae) with 14, 15 and 16 chromosome cytotypes in the same geographic area in southern Brazil. *Brazilian Journal of Genetics* 19: 565-569.

Thomas, O. 1902. On mammals from the Serra do Mar of Paraná, collected by Mr. Alphonse Robert. *Annals and Magazine of Natural History* 7: 59-64.

RECEIVED: February 2012
ACCEPTED: August 2012
PUBLISHED ONLINE: December 2012
EDITORIAL RESPONSIBILITY: Marcelo Passamani